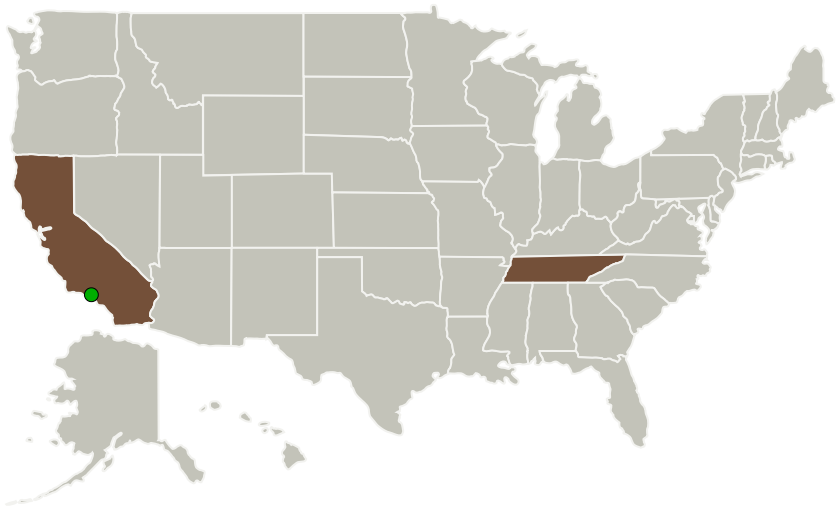
# Multi Domain Modeling for Space Systems, Phase I

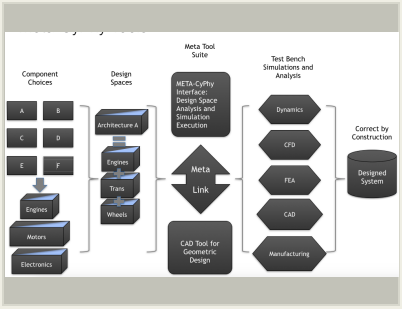
Completed Technology Project (2015 - 2016)

## Project Introduction

A comprehensive model-based approach will be enabled for space systems design via the work started on Phase I of this project. The OpenMETA toolkit is a cyber-physical modeling tool for the design and virtual integration of complex systems, developed under the DARPA AVM Program. OpenMETA will be leveraged and extended to support NASA/JPL goals for multi-physics, multi-domain modeling, analysis, optimization, and uncertainty quantification of spacecraft and space systems. Specific extensions include supporting preferred CAD tool (Siemens NX), FEA Meshing (FEMAP), and IMUQ uncertainty quantification. In addition, the use of external, configuration-managed databases will be supported to track design parameter evolution. The tool's utility will be evaluated and demonstrated via a set of use cases and end-to-end experiments.

## Primary U.S. Work Locations and Key Partners



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**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| MetaMorph, Inc. | Lead Organization | Industry | Nashville, Tennessee |
| Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |
| Vanderbilt University | Supporting Organization | Academia | Nashville, Tennessee |

| Primary U.S. Work Locations | |
|---|---|
| California | Tennessee |

## Project Transitions

**June 2015:** Project Start

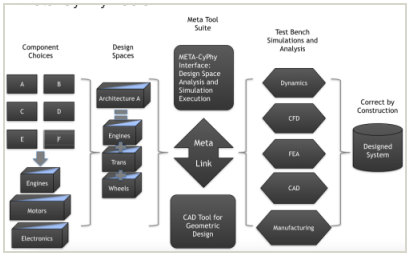
**June 2016:** Closed out

**Closeout Summary:** Multi Domain Modeling for Space Systems, Phase I Project Image

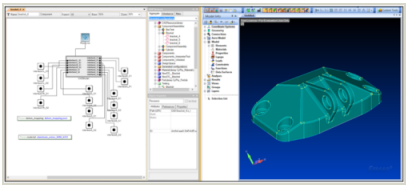
**Closeout Documentation:**

- Final Summary Chart Image*(https://techport.nasa.gov/file/139251)*

## Images




**Briefing Chart Image**
Multi Domain Modeling for Space Systems, Phase I
*(https://techport.nasa.gov/image/129936)*



**Final Summary Chart Image**
Multi Domain Modeling for Space Systems, Phase I Project Image
*(https://techport.nasa.gov/image/127578)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
MetaMorph, Inc.

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

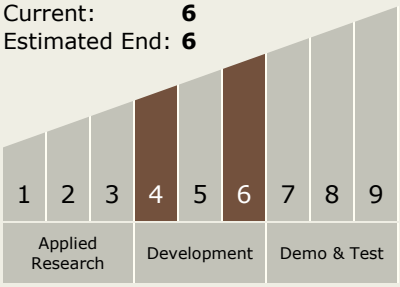
**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Adam B Nagel

## Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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## Technology Areas

**Primary:**

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.2 Integrated Hardware and Software Modeling

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System